

II. BACKGROUND

A. ATLAS

State Population: 2000 - 1,048,319

State Surface Area: Land Only - 1,058 Mi.²
Total Area* - 1,214 Mi.²
(*Including Inland Waters; Excluding Estuarine Areas)

Number of Major Watersheds: 10

Number of 8 digit HUCs: 5

Total Stream/River/ Miles: 1,498 Miles
(1:24,000 RIGIS)

Lakes/Ponds Total Acreage : 20,917 Acres
(1:24,000 RIGIS)

WETLAND TYPE	AREA (acres)
Riverine Nontidal Open Water	1832
Lacustrine Open Water	17,518
Palustrine Open Water	4481
Palustrine Emergent Wetland: Marsh/Wet Meadow	4341
Palustrine Emergent Wetland: Emergent Fen or Bog	229
Palustrine Scrub-Shrub Wetland: Shrub Swamp	9606
Palustrine Scrub-Shrub Wetland: Shrub Fen or Bog	2060
Palustrine Forested Wetland: Deciduous	60,694
Palustrine Forested Wetland: Coniferous	10,900
Palustrine Forested Wetland: Dead	225
Riverine Tidal Open Water	7.4
Estuarine Open Water	8175
Estuarine Emergent Wetland	4014
Estuarine Scrub-Shrub Wetland	93
Marine/Estuarine Rocky Shore	671
Marine/Estuarine Unconsolidated Shore	2874
TOTAL AREA	127,721 acres

Area of Estuarine Waters : 156.29 square miles

Coastal Shoreline Miles: 78.62 miles

B. WATER POLLUTION CONTROL PROGRAM

1. Watershed Approach

The watershed approach is a better way of managing our natural resources. The approach brings together government agencies, interest groups, businesses, and citizens to work on environmental issues ranging from water quality protection to open space acquisition within a watershed. The partnership aims to coordinate what have traditionally been separate government programs to use existing resources more effectively. Watershed partners share ideas, pool resources and work together to meet common goals to protect the environment on a regional basis.

In 2000, the Rhode Island Watershed Approach partners continued to work on regional and ecosystem-based solutions to issues that cross boundaries, such as restoring water quality, remediating contaminated sites and preserving significant landscapes. RIDEM's new Sustainable Watersheds Office plays a key role in the partnership by providing a watershed coordinator for the South County Watersheds and the Northern Region. These coordinators are helping to prepare Watershed Action Plans and are helping to form broad partnerships with DEM personnel, other state and federal agencies, municipalities, non-profit organizations, and residents to target resources toward implementing watershed-specific action items.

Watershed Action Plans were completed for the South County (Narrow River, Saugatucket River, Salt Ponds, and Pawcatuck River) and Woonasquatucket watersheds. This is the first time that locally based organizations had a direct role in determining what needs to get done within their respective watersheds. It is also the first time that federal, state and non-profit partners have coordinated their work plans to implement community based projects. To help build the capacity of watershed groups, the Watershed Approach Coordinating Council, made up of leaders from state and federal agencies, non-governmental organizations, private industry, and other partners, signed a funding resolution to support local watershed organizations. In addition, the RIDEM has completed a web-based grant guide for watershed organizations and coordinated Watershed Training for summer naturalists in state parks. A Watershed Resource guide was produced through the cooperation of several partner organizations.

The South County Watershed partners have focused on land use and growth. They published the South County Design Manual, South County Watershed Model Land Use Ordinances, Rapid Site Assessment Guide, and Farmland and Forestry Strategies, including a report on a Transfer of Development Rights program in Rhode Island.

The Woonasquatucket watershed team focused on remediating contaminated sites and restoring habitat for bikeways and greenways. DEM conducted sampling and developed a remediation plan for the Lincoln Lace and Braid site and used oil spill prevention funds to clean up underground storage tanks at the Riverside Mills site. The Department coordinated cleanup of the Centredale Manor Superfund site and Allendale Dam in preparation for eventual replacement of the dam. The team used a \$67,000 US Forest Service grant to identify 40 sites along the river for reforestation. They are establishing a reforestation demonstration site at the Riverside Mills, seeking funds to restore other sites. Future plans include developing a website to showcase restoration costs and benefits.

As of July 1, 2001 the Northern Region Watersheds Coordinator has expanded his work into the Blackstone River Watershed, which drains 140 square miles in northern Rhode Island. The Sustainable Watersheds Office is working with Massachusetts EOEa to coordinate

the first interstate Watershed Team. Other bi-state initiatives include the proposed Blackstone River Watershed Interstate Gateway Project, a riparian restoration and multi-use site development located on the state line. In an effort to build upon existing data compiled in the Blackstone River Build-Out Analysis, the Sustainable Watersheds Office is pursuing funding to complete a Greenspace Implementation Strategy for the Rhode Island portion of the Blackstone River Watershed. The Coordinator has met with local planners in each of the nine Rhode Island municipalities located within the watershed, and is in the process of developing a Watershed Action Plan for the region. Action Plan development includes stakeholder support from existing agencies and groups, including the John H. Chafee Blackstone River Valley National Heritage Corridor, the Blackstone Valley Tourism Council, and the Blackstone Watershed Council.

2. Water Quality Standards Program

The Standards Section of the Office of Water Resources (OWR) implements the state's Water Quality Standards Program. The Water Quality Standards Program is responsible for ensuring compliance with the Federal Clean Water Act (CWA). The purpose of this program is to restore, preserve, and enhance the water quality of Rhode Island waters, to maintain existing uses and to protect the waters from pollutants so that the waters shall, where attainable, be fishable and swimmable, and be available for all designated uses and thus assure protection for the public health welfare, and the environment. These objectives are implemented through the water quality standards which are a fundamental element of the state's Water Quality Regulations. The water quality standards are developed to define water quality goals for the state's waters by deciding what their uses will be (designated uses), setting criteria necessary to protect those uses and developing policies to prevent degradation of water quality. In addition to establishing water quality goals for state waters, surface water quality standards also serve as the regulatory basis for the establishment of water-quality-based treatment controls and strategies beyond technology-based controls.

The present water quality condition of each waterbody may, or may not, fully support the designated goal. However, all activities which require an environmental approval must conform to the water quality criteria necessary to attain the designated use for that waterbody. Waters whose quality exceeds the minimum water quality criteria or water quality standard assigned to them are protected to maintain their high quality under the Antidegradation provisions of the Water Quality Regulations.

The surface waters in Rhode Island were classified in the 1960's and 1970's. Some changes have been made over the years. As part of the CWA-mandated triennial water quality standards and criteria review, OWR finalized changes to the Water Quality Regulations in August 1997. The revisions to the Water Quality Regulations included modifications, updates and clarification of the designated uses of waters, classifications, criteria, rules and policies. The OWR modified the classifications such that the water quality goals of all Rhode Island waters meets the "fishable/swimmable" goals of the Clean Water Act. A triennial review of the Water Quality Regulations is currently underway.

The surface waters of the state are assigned to one of three freshwater, or one of three saltwater, classifications. Each class is defined by the designated uses which are the most sensitive and, therefore, governing water use(s) which it is intended to protect. Surface waters may be suitable for other beneficial uses, but are regulated to protect and enhance the designated uses. In no case is waste assimilation or waste transport be considered a designated use. A fourth classification, Class C or SC, is available should it be proven through the Use Attainability process that this classification is appropriate. This C or SC classification is not,

however, currently designated to any waterbodies. The Rhode Island Water Quality Classifications are as follows:

Freshwater:

- (a). Class A[@] - These waters are designated as a source of public drinking water supply, for primary and secondary contact recreational activities and for fish and wildlife habitat. They shall be suitable for compatible industrial processes and cooling, hydropower, aquacultural uses, navigation, and irrigation and other agricultural uses. These waters shall have good aesthetic value.
- (b). Class B^{*} - These waters are designated for fish and wildlife habitat and primary and secondary contact recreational activities. They shall be suitable for compatible industrial processes and cooling, hydropower, aquacultural uses, navigation, and irrigation and other agricultural uses. These waters shall have good aesthetic value.
- (c). Class B1^{*} - These waters are designated for primary and secondary contact recreational activities and fish and wildlife habitat. They shall be suitable for compatible industrial processes and cooling, hydropower, aquacultural uses, navigation, and irrigation and other agricultural uses. These waters shall have good aesthetic value. Primary contact recreational activities may be impacted due to pathogens from approved wastewater discharges. However all Class B criteria must be met.
- (d). Class C - These waters are designated for secondary contact recreational activities and fish and wildlife habitat. They shall be suitable for compatible industrial processes and cooling, hydropower, aquacultural uses, navigation, and irrigation and other agricultural uses. These water shall have good aesthetic value.

[@] Class A waters used for public drinking water supply may be subject to restricted recreational use by State and local authorities.

^{*} Certain Class B and B1 waterbody segments may have partial use designations assigned to them.

Seawater:

- (a). Class SA^{*} - These waters are designated for shellfish harvesting for direct human consumption, primary and secondary contact recreational activities, and fish and wildlife habitat. They shall be suitable for aquacultural uses, navigation and industrial cooling. These waters shall have good aesthetic value.
- (b). Class SB^{*} - These waters are designated for primary and secondary contact recreational activities; shellfish harvesting for controlled relay and depuration; and fish and wildlife habitat. They shall be suitable for aquacultural uses, navigation, and industrial cooling. These waters shall have good aesthetic value.
- (c). Class SB1^{*} - These waters are designated for primary and secondary contact recreational activities and fish and wildlife habitat. They shall be suitable for aquacultural

uses, navigation, and industrial cooling. These waters shall have good aesthetic value. Primary contact recreational activities may be impacted due to pathogens from approved wastewater discharges. However all Class SB criteria must be met.

- (d). Class SC - These waters are designated for secondary contact recreational activities, and fish and wildlife habitat. They shall be suitable for aquacultural uses, navigation, and industrial cooling. These waters shall have good aesthetic value.

* Certain Class SA, SB and SB1 waterbody segments may have partial use designations assigned to them .

In addition, the state has incorporated partial use classifications into the Water Quality Regulations. Partial use denotes specific restrictions of use assigned to a waterbody or waterbody segment that may affect the application of criteria. For example, a partial use designation may be appropriate where waters are impacted by activities such as combined sewer overflows and concentrations of vessels.

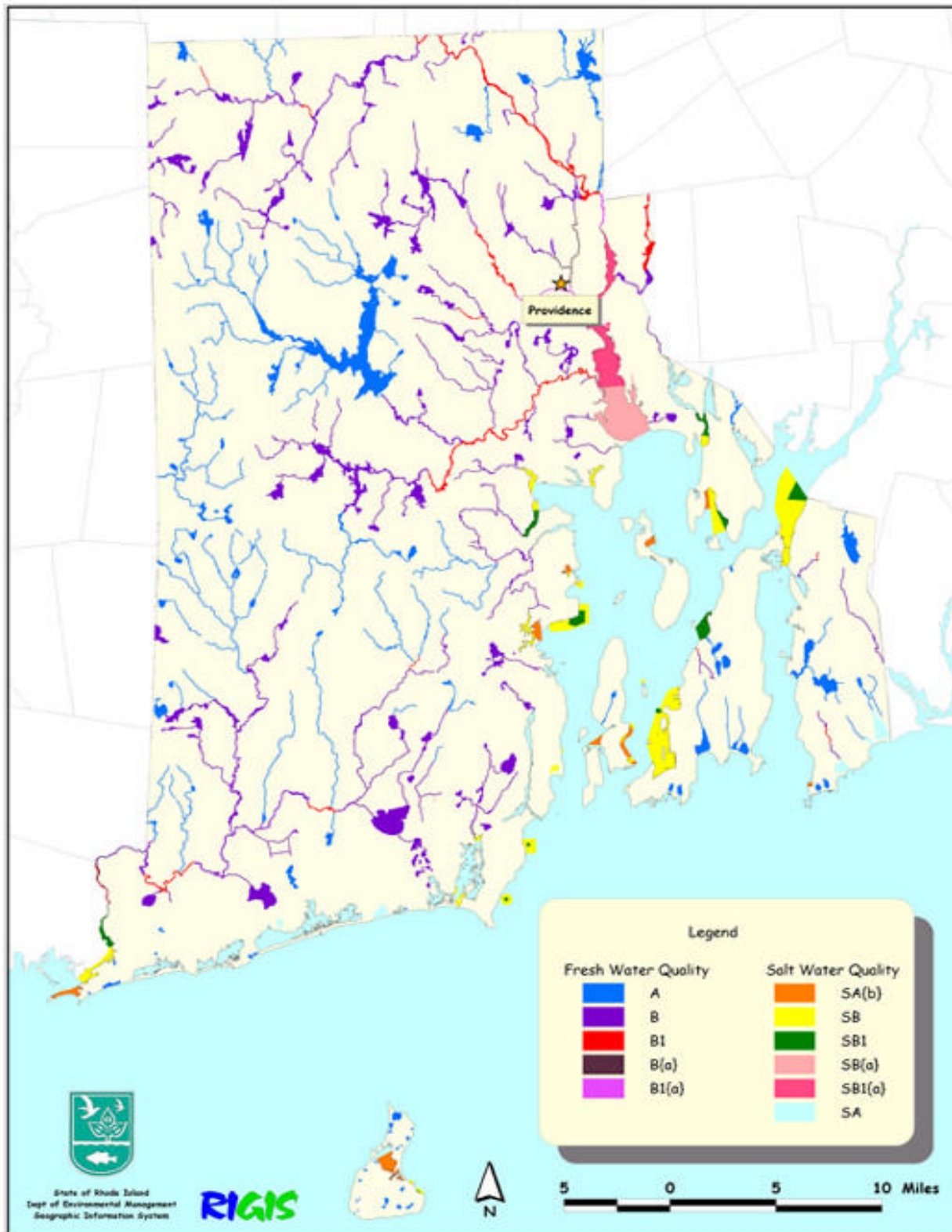
Partial Uses:

- (a). CSO - These waters will likely be impacted by combined sewer overflows in accordance with approved CSO Facilities Plans and in compliance with rule 19.E.1 of the Water Quality Regulations and the Rhode Island CSO Policy. Therefore, primary contact recreational activities; shellfishing uses; and fish and wildlife habitat will likely be restricted.
- (b). Concentration of Vessels - These waters are in the vicinity of marinas and/or mooring fields and therefore seasonal shellfishing closures will likely be required as listed in the most recent (revised annually) RIDEM document entitled Shellfish Closure Areas. For Class SA waters, all Class SA criteria must be attained at all times.

The surface waters of the state are classified according to the list of water segments in Appendix A of the Water Quality Regulations. For waters not listed in Appendix A, the following apply:

- (1). All streams tributary to Class A waters shall be Class A.
- (2). All freshwaters hydrologically connected by surface waters and upstream of Class B, B1, SB, SB1, C or SC waters shall be Class B unless otherwise identified in Appendix A of these regulations.
- (3). All other fresh waters, including, but not limited to, ponds, kettleholes and wetlands not listed in Appendix A shall be considered to be Class A.
- (4). All seawaters not listed in Appendix A shall be considered to be Class SA. All saltwater and brackish wetlands contiguous to seawaters not listed in Appendix A shall be considered to be Class SA.
- (5). All saltwater and brackish wetlands contiguous to seawaters listed in Appendix A shall be considered the same class as their associated seawaters.

Figure 2-1 Rhode Island Water Quality Standards Map



3. Point Source Control Program

The OWR regulates the design, construction, and operation and maintenance of wastewater treatment facilities. Wastewater discharge permitting and the implementation of the pretreatment program as well as stormwater permitting, is carried out by OWR through the federally delegated Rhode Island Pollution Discharge Elimination System (RIPDES) Program. The OWR staff also conduct operation and maintenance inspections and compliance evaluations at all major and minor municipal facilities. Review and approvals of wastewater facility plans, engineering reports and engineering plans and specifications for WWTF improvements, sanitary sewer systems and marine sewage pumpout facilities are conducted by the OWR staff.

a. Permitting

i. RIPDES

The Office of Water Resources (OWR) was delegated the authority to implement the National Pollution Discharge Elimination System (NPDES) Program, referred to as the RIPDES Program in Rhode Island, on September 17, 1984. The focus of the RIPDES Program has shifted from a treatment technology based permitting approach used in the past, to now stress the development of water quality based permit limitations that ensure that the receiving water will comply with applicable water quality criteria. Currently, the RIPDES Program has 19 active major municipal permittees with a total average daily permitted flow of 193.55 MGD and 6 active major industrial permittees with a total average daily permitted flow of 4.246 MGD. In addition to major facilities, the RIPDES Program is also responsible for permitting minor facilities. Figure 2-2 shows the location of the RIPDES permittees.

All of the major industrial and municipal RIPDES permits either contain water quality based limits or an analysis has been conducted which shows that water quality based limits are not necessary. The resulting permits typically contain limitations which permittees are unable to immediately comply with and, therefore, compliance schedules must be developed. It is a priority of the RIPDES Program to ensure that permittees complete the steps contained in these compliance schedules such that compliance with water quality based permit limits is achieved.

The RIPDES Program is also involved in the Narragansett Bay Commission (NBC) and Newport Combined Sewer Overflow (CSO) abatement planning projects. Currently there are three CSO treatment structures in Rhode Island. The NBC's Wet Weather Facility located at the Fields Point Wastewater Treatment Facility (WWTF) provides primary treatment for up to 123 MGD of wet weather flow. Newport's Washington Street CSO Facility provides storage for flow resulting from up to a three month storm and provides treatment for flows up to the one year storm. The third CSO treatment facility is Newport's Wellington Avenue Micro-strainer facility.

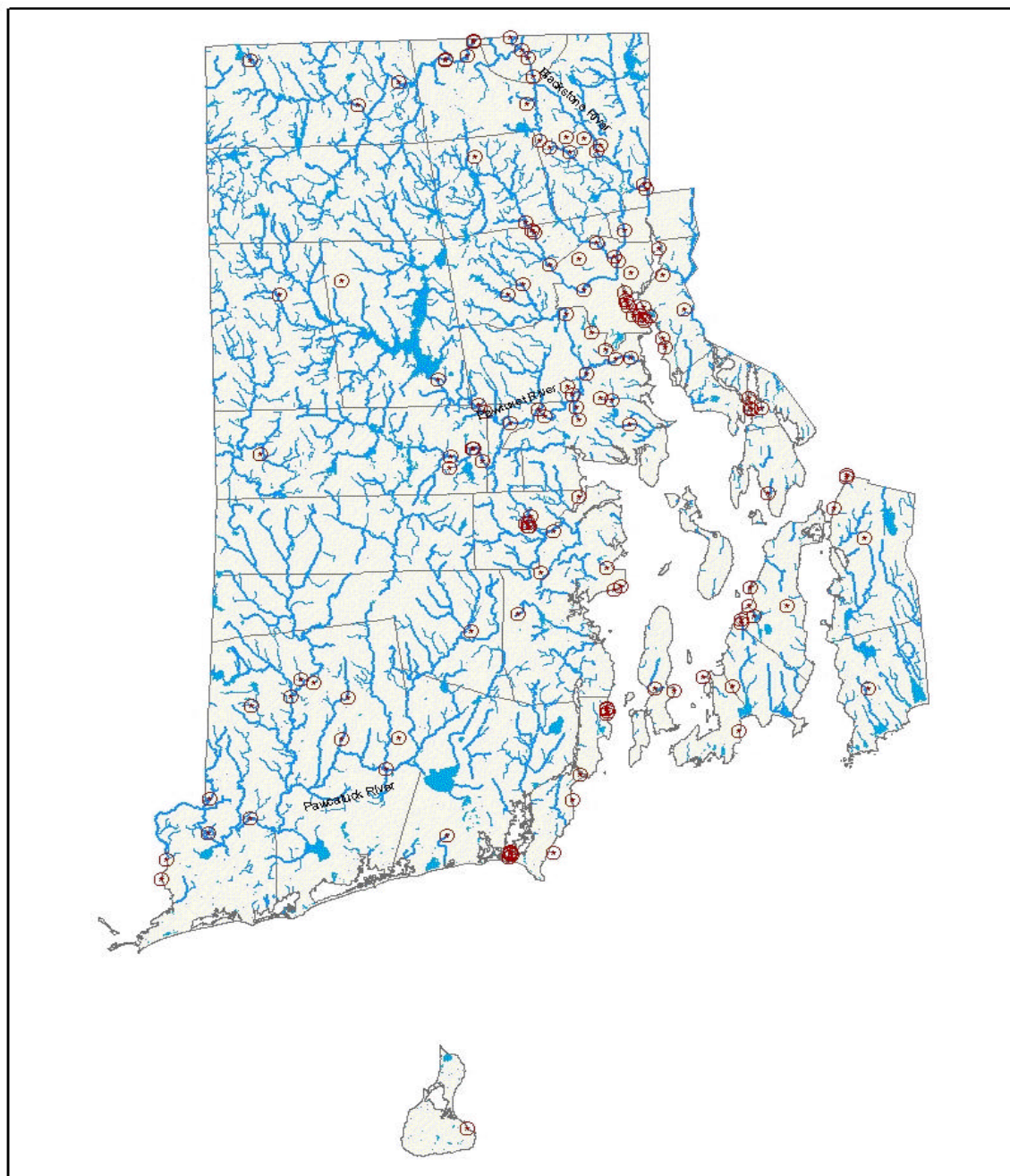
The NBC has finished 100% design documents for the Phase I CSO facilities, which include the Main Spine Tunnel, Near Surface Facilities and Drop and Vent Shafts, which was approved by DEM in April 2001. The first of approximately 14 construction contracts for Phase I is currently underway in the vicinity of the Providence Hurricane Barrier. NBC is currently working on

the 100% design documents for other Phase I work which includes the Tunnel Pump Station and associated Control System. NBC has also completed 100% design documents for an upgrade to the Bucklin Point WWTF. The estimated total Phase I project cost is approximately \$180 million, based on 1999 dollars.

Phases II and III include the Pawtucket Tunnel, CSO interceptors, various sewer separation projects, and a wetland/lagoon treatment system which will proceed at a later date.

Other RIPDES Program responsibilities include the following: issuance of RIPDES permits to discharges necessary for the remediation of contaminated groundwater at Superfund and RCRA sites (including Davis Liquid, Rose Hill and Stamina Mills); issuance of general permits for discharges associated with the treatment of gasoline and/or #2 fuel oil contaminated groundwater; inspections of permitted facilities; and finalization of a general permit for discharges of non-contact cooling water.

Figure 2-2 : Locations of RIPDES Discharges



ii. Pretreatment

OWR evaluates the status of the Publicly Owned Treatment Works (POTWs) Industrial Pretreatment Programs through Pretreatment Audits, Pretreatment Compliance Inspections (PCIs), review of updated program documentation as required (e.g., sewer use ordinances, technically-based local limits evaluations, enforcement response plans, sampling/inspection procedures, etc.), and review of annual reports required by POTW RIPDES permits. Moreover, the OWR continues to provide the POTWs with technical assistance and guidance in categorizing Industrial Users, interpretation and implementation of pretreatment regulations, administration of their pretreatment programs and enforcement issues.

The OWR provides ongoing oversight of fifteen approved local pretreatment programs. These programs regulate approximately 300 Significant Industrial Users (SIUs), over half of which are subject to Federal Categorical Pretreatment Standards.

The OWR's Pretreatment Section is also responsible for evaluating and assisting approved local pretreatment programs by regularly reviewing requests for modifications to existing local pretreatment programs in accordance with Federal and State Pretreatment Regulations.

A quarterly report summarizing all pretreatment activities is developed and submitted to the EPA. Pretreatment Enforcement Tracking (PETs) data is entered directly into the EPA central computer database.

iii. Stormwater

The OWR initiated a Stormwater Permitting Program using funds from EPA's Section 104(b)(3), in 1992. Stormwater regulations and general permits for discharges of stormwater associated with industrial activity and construction activity became effective on March 9 and March 19, 1993, respectively. These general permits were reissued in March 1998 and are effective for a 5-year period. The OWR continues to permit both construction activities and industrial facilities under these permits.

The OWR is also developing Phase II stormwater regulations that will cover operators of small separate storm water systems (MS4s) in "urbanized areas" (UAs) as defined by the Bureau of the Census as well as construction activities disturbing equal to or greater than 1 acre and less than 5 acres. In addition to developing Phase II regulations, the RIPDES Phase II Program develops criteria and processes to designate MS4s outside of UAs as well as develop and issue permits. Since August 2000, DEM has been meeting with stakeholders to discuss the EPA Phase II program and draft state regulatory amendments. As a result of these meetings, the draft amendments to the RIPDES regulations include a few enhancements which include establishment of criteria for MS4s located outside of UAs, specification of waiver application requirements and greater definition of the applicability to DOT and state and federally owned MS4s. RIDEM released these draft regulations for public comment on July 2, 2001. RIDEM will hold a Public Workshop to present the

draft regulations as well as to address questions on July 25, 2001. The Public Hearing is scheduled for August 14, 2001.

The OWR will also be working on the issuance of a multi-sector stormwater permit. This permit will establish industrial “sectors” for various groups of industrial categories. The multi-sector stormwater permit will have permit requirements that are specific to each industrial category.

iv. Sludge Management

The DEM/OWR has “Rules and Regulations Pertaining to the Disposal, Utilization and Transportation of Wastewater Treatment Facility Sludge.” The regulations contain requirements dealing with land application, land disposal, composting (and other treatment methods), incineration, and distribution/utilization of sludge generated by municipal wastewater treatment facilities. The state will continue to issue Orders of Approval to wastewater treatment plants for the treatment, disposal, distribution, and utilization of sewage sludge, in accordance with the regulations. All sludge sites are inspected at least once per quarter to assure compliance with the regulations.

v. Water Quality Certification

The OWR administers the Water Quality Certification (WQC) Program aimed at insuring that certain types of projects or activities do not adversely impact the quality of the state’s surface water resources. Water Quality certification is required by Section 401 of the Clean Water Act.

The WQC review consists of an evaluation of compliance with water quality standards, especially designated uses. Included in the certification review process are activities such as dredging projects, fill projects, site disturbances, marina construction or expansion, flow alterations and harbor management plans. The recent Water Quality Regulation triennial review adopted new processing procedures for WQC approvals.

vi. Enforcement/Permit Compliance

DEM recognizes that protection of water quality requires effective compliance oversight and enforcement of regulations concerning water pollution control. Under DEM's current structure, certain enforcement capabilities are consolidated within the Office of Compliance and Inspection (OC&I). Generally, this Office will be issuing formal Notices of Violation (NOVs) and investigate the majority of water-related complaints. Contested matters are generally appealed to the DEM Office of Administrative Adjudication.

OWR intends to encourage and/or maintain high level of voluntary compliance in programs such as RIPDES via administrative actions. Compliance matters requiring formal enforcement will be referred from OWR to OC&I as warranted. Resolution of any formal NOV is achieved by close coordination between the two offices, particularly in matters that involve obtaining a permit. When needed, OWR supports formal enforcement actions by providing additional technical staff expertise and assistance in

contested cases or as needed.

Within the RIPDES Program, OWR oversees compliance with permit requirements including computerization of data and issuing SNC letters. The RIPDES and Pretreatment Programs utilize EPA's Permit Compliance System (PCS) to track compliance with program requirements including, but not limited to the generation of the Quarterly Non-Compliance Reports (QNCRs).

vii. Wastewater Treatment Facilities Program

This program is responsible for the review and approval of wastewater facilities plans (a 20 year master plan for a community's wastewater needs), engineering reports and engineering design plans and specifications. Plans and specifications reviewed and approved include wastewater treatment facilities (WWTF) improvements, wastewater collection system expansion/improvements (projects with more than 30,000 gpd flow on an average daily basis) and marine sewage pumpout facilities. In addition, this program routinely performs field inspections of wastewater-related construction projects which are funded by the OWR's Funding Assistance Program, or are required as part of an enforcement action.

This program also has an active role in reviewing privatization agreements between municipalities and private companies hired to operate and maintain wastewater treatment and/or collection facilities, as well as providing system-wide capital improvements.

b. Point Source Control Monitoring Programs

i. Whole Effluent Toxicity Testing

Nineteen major wastewater treatment facilities and 5 major industrial facilities are required to perform bioassays to evaluate whole effluent toxicity associated with their discharges. The results of these bioassays are used to determine whether further biomonitoring and/or toxicity reduction is needed in addition to permit limitations. Oversight and implementation of the WET testing program and evaluation of a whole effluent toxicity enforcement strategy is conducted by the OWR.

ii. User Fee Program

Chapter 46-12.4 of the Rhode Island General Laws authorized the Director of the Department of Environmental Management (DEM) to establish a system whereby fees were to be assessed for point source discharges into State waters. For the purposes of this act, a program has been implemented since 1983 in which effluent samples are collected at a minimum, annually, at all municipal dischargers and selected major and minor industrial dischargers. This constitutes sampling at a total of approximately 25 sites per year (cycle), with the major facilities being sampled 2 times per year. Sampling frequency depends upon the amount and type of pollutants present in the sample, with more frequent sampling performed at those discharges which are of greater environmental concern. These effluent samples are analyzed for EPA "Priority Pollutants." This data is utilized in permit revision evaluations and water quality impact analyses.

iii. Wastewater Facility Operation and Maintenance/Compliance Evaluations

The purpose of the Operation and Maintenance (O & M) Section within the OWR is to protect the quality of the state's waters by ensuring proper operation and maintenance of wastewater systems. The O&M staff inspect all major municipal dischargers at least once a year. Previously these facilities were inspected approximately every 4 to 6 weeks, however the frequency was reduced due to a reduction in staff. These inspections should be comprised of a full plant walk-through and discussion session with responsible plant personnel. However, staffing and workloads may result in less thorough partial inspections. At each inspection, O&M inspectors comment on general plant operations, maintenance, or housekeeping improvements. Less frequently, staff also inspects the various off-site pump stations that are part of a wastewater facility's collection system (approximately every 3 – 4 years or as needed.)

In addition to the above operations and maintenance inspections, the State will continue annual inspections of major permittees (municipal and industrial) utilizing EPA Compliance Evaluation Inspection Forms. Effluent sampling is no longer a part of these annual inspections.

The O&M staff also investigate and report for possible enforcement actions on any failures, emergencies or bypasses at these facilities or their pump stations. There are roughly 30 - 60 such occurrences each year.

O&M staff also assist in the administration of EPA QA/QC programs for wastewater laboratories.

Projects for 2000-2002 includes redrafting the O&M regulations and developing a program for the re-use of treated wastewater.

While wastewater treatment plants which may potentially impact shellfish growing areas were previously sampled on a weekly basis when the upper Narragansett Bay would be open to shellfishing, a reduction in staffing has required this monitoring to be suspended in 1998.

iv. Wastewater Facility Operation and Maintenance/Operator Certification

The O&M program provides administrative support and engineering assistance to the Rhode Island Board of Certification of Operators of Wastewater Treatment Facilities. The O&M Section's Principal Engineer is the Board's chair.

v. Wastewater Facility Operation and Maintenance/Operator Training

The O&M section also administers the Municipal Assistance/Operator Training Program, which is designed to provide on-site and classroom training on general or plant-specific technical (and non-technical) issues. The goal of the assistance is to bring plants into compliance or maintain compliance. Over the past year the program has focused on optimizing current facilities for ammonia and total nitrogen removal. A new initiative will be the development of online training programs.

4. Financial Assistance

In order to achieve the water pollution abatement/water quality goals of the State of Rhode Island, the Office of Water Resources (OWR) manages several funding assistance programs intended to aid governmental entities, businesses, and individuals in the planning, design and construction of their projects. These financial assistance programs consist of funds provided by both the State and federal government.

The State Revolving Fund (SRF) is Rhode Island's largest financial assistance program. The SRF program is co-managed by OWR and the RI Clean Water Finance Agency. Since the program's inception in 1990, the SRF program has awarded over \$206,000,000 in below market rate interest loans for 160 projects in 23 communities. While sewer extensions are the type of project most often funded, the SRF program has also provided assistance to wastewater treatment facility improvements, pumping station repairs and landfill closures. The SRF program has recently implemented a loan program to provide access to homeowners to low cost financing for septic system repairs.

Prior to being replaced by the SRF program, the Construction Grants program was the primary source of water pollution abatement financing. The Construction Grants program, which was responsible for bringing all wastewater treatment facilities in the state to secondary treatment, awarded its last major grant in 1990. The Construction Grants program was closed out in 1998.

Two state bond funded programs are in the process of awarding their last grants. Over the past ten years the Aqua Fund has awarded sixty-seven (67) grants to communities and quasi-state organizations. Besides point source and non-point source water pollution abatement projects, the Aqua Fund has funded many innovative water quality protection projects. Indicative of this overall record, in its most recent round of grants, the Aqua Fund funded a landfill closure, an urban pond restoration and a study to determine the feasibility of constructing fish passage facilities to a river that has been dammed since the 18th century.

The Non-Governmental Water Pollution Control Facilities Fund has roughly \$50,000 to award to businesses, industries, farmers and non-profit organizations. In the past this program funded industrial pretreatment units, new septic systems, marina pumpout facilities, and agricultural best management practices. Table 2-1 below briefly details the funding provided by the OWR financial assistance programs:

Table 2-1 Funding Sources and Assistance Awards

Fund	Since 1972 CWA	Last 10 Years (1991 - 2001)	Last 2 Years (2000 – 2001)
SRF leveraged	\$159,765,000	\$159,765,000	\$50,560,000
SRF direct	\$45,886,517	\$45,886,517	\$19,627,285
SRF state fund	\$1,095,000	\$1,095,000	\$175,000
Construction Grants	\$284,200,000	\$15,700,000	\$1,120,000
Construction Grants State Match	\$64,600,000	\$3,100,000	\$224,000
RI Non-Governmental Fund*	\$1,461,950	\$1,461,950	\$146,865
RI Interceptor Bond Fund**	\$1,061,832	\$1,061,832	\$0
RI Sewage and Water Supply Failure Fund	\$5,000,000	\$5,000,000	\$0
RI Pawtuxet River Bond Fund	\$7,543,694	\$7,543,694	\$1,572,261
RI Aquafund	\$9,632,626	\$9,632,626	\$627,683
TOTAL	\$544,930,525	\$214,930,525	\$84,841,230

* This fund provides grants to businesses, industries, and other non-governmental entities.

** Includes \$54,572 in low interest ISDS repair loans to individuals.

5. Narragansett Bay Estuarine Program CCMP

The Narragansett Bay Estuarine Program (NBEP) is a federally funded program authorized in the Federal Clean Water Act, Section 320, National Estuary Program. It's purpose is to protect and restore water quality, natural resources, critical habitats, and uses through implementation of the Narragansett Bay Comprehensive Conservation and Management Plan (CCMP). The CCMP has been adopted as an element of the State Guide Plan and includes strategies for achieving the stated objectives for protecting and/or restoring the water quality and resources of Narragansett Bay.

The CCMP is based on the following overall goals:

- To prevent further degradation and incrementally improve water quality in developing coastal areas with deteriorating water quality;

- To protect diminishing high quality resource areas throughout the Bay watershed;

- To more effectively manage commercially, recreationally, and ecologically important estuarine-dependent living resources;

- To rehabilitate degraded waters in the Bay watershed and restore water quality-dependent uses of Narragansett Bay;

- To establish necessary interstate and interagency agreements and mechanisms to coordinate and oversee implementation of the Narragansett Bay Comprehensive Conservation and Management Plan.

The project staff are currently implementing priority recommendations of the CCMP (see Chapter III.F.). Specific program strategies include: creating projects using partnership with municipalities, agencies and nonprofits; securing the scientific data needed to support policy initiatives and develop effective management strategies; providing outreach on the Bay and watershed ecosystem through workshops, conferences, and educational events; securing additional funding for CCMP implementation; addressing priority water quality and living resource issues in the Bay; identifying and analyzing emerging Bay issues (e.g., introduced species); and building work plans that reflect the action items identified in the CCMP and at the Bay Summit 2000.

6. Nonpoint Source Control Program

The RIDEM's Nonpoint Source Pollution Management Program was established in accordance with Section 319 of the Water Quality Act of 1987. This non-regulatory program was previously administered by the Department's Office of Environmental Coordination. Pursuant to the Department's reorganization in 1996, the Nonpoint Source Program was integrated into the Watershed Approach and is now administered by the OWR. This Program implements the Nonpoint Source Management Plan with the goals of mitigating existing and preventing subsequent nonpoint source pollution.

The Program is involved in a number of activities. In particular, over the past year key activities have included: (1) Septic System Maintenance Policy Forum; (2) Storm Water Management; (3) support of TMDLs; (4) support of improved land management and (5) solicitation of community projects through a competitive granting process.

- a. Septic Systems - Nonpoint Source (NPS) program work on septic system issues has largely been guided by the Septic System Maintenance Policy Forum

(SSMPF). The NPS Program formed the SSMPF in November 1995 to promote proper onsite wastewater management and to implement onsite disposal system (OSDS) management measures of the Coastal Nonpoint Pollution Control Program (CNPCP). The SSMPF has provided an excellent arena for the development of innovative policy. Four important outputs have resulted: (a) *Septic System Check-Up*, (b) the Community Septic System Loan Program (CCSLP), and (c) financial and technical assistance to communities that rely on septic systems, and (d) a manual entitled *Rhode Island Municipal Standards and Programs*.

Septic System Check-Up is a unique guidance manual that is changing the septic system inspection industry. Previously, no standards existed for proper inspection and maintenance of septic systems. The unavailability of standards has been particularly problematic for home sellers and buyers. Nonstandardized inspections leave both parties with nagging uncertainty. Lack of technical documentation on septic system maintenance also creates controversy during the development of local wastewater management programs. In several instances, such controversy may have prevented the adoption of programs and ordinances. *Septic System Check-Up* fills the information gap with two types of inspections:

- 1) A maintenance inspection to determine if pumping and minor repairs are needed; and
- 2) A functional inspection for use during property transfer.

Septic System Check-Up not only standardizes inspections procedures but in many cases documents procedures for the first time and some procedures were actually invented for the handbook.

Rhode Island Municipal Septic System Standards and Programs is a manual that was compiled primarily for use by municipalities that are interested in developing various aspects of wastewater management programs. It provides summaries of all the Rhode Island municipal programs related to proper management of septic systems. It also includes an appendix with each community's ordinances and regulations.

CSSLP provides low-interest loan funds for the purpose of septic system repair and replacement. CSSLP represents the first-ever, self-renewable, statewide funding source for septic system repair replacement in Rhode Island. It is also an innovative use of the State Revolving Fund (SRF) and marks the first time that a New England state has used SRF in such a fashion. CSSLP is being initiated and administered by the Rhode Island Clean Water Finance Agency, however, NPS program staff have been important to the early planning for the program. For instance, the Rhode Island Nonpoint Source Bond Fund has provided grants for 21 communities to develop onsite wastewater management programs for CSSLP funding. The pilot projects are overseen by NPS staff. Two communities have taken loans, while several others are in the loan making process.

This year the Nonpoint Source Management Program chaired the RIDEM Director's ISDS Task Force--Outreach and Training Subgroup. The subgroup met on October 3rd and 23rd, 2000 to address 18 issues related to providing outreach and training to municipalities, the private sector and the general public on proper septic system management and recent technological advances. As a result of the task force, a report was developed entitled *RIDEM Director's ISDS Task Force Outreach and Training Subgroup*, which includes a specific strategy to address the 18

aforementioned issues.

b. Land Use – In 1996, work was completed on the *Nonpoint Source Pollution Control Workbook for Rhode Island Cities and Towns*. The workbook was developed with Section 319 and 320 funds by the Rhode Island Chapter of the APA, the APA's Chicago based Research Department and Horsely and Whitten. The workbook is intended to assist local government officials, engineers, water quality specialists, planners and citizens in understanding the impacts of NPS pollution. It focuses specifically on describing the nature of NPS pollution and BMPs.

The NPS program has completed its Nonpoint Source Consistency Review project. Thirty-nine cities and towns submitted community comprehensive plans (CCP) for NPS review. The NPS program continues to review plans and plan revisions as appropriate. The NPS program also continues to distribute technical land-use materials to communities as requested. The *Rhode Island Community Nonpoint Source Management Guide* has been particularly valuable and is frequently used by URI/CE in their training workshops.

c. Groundwater Implementation Activities – Since 1996, the wellhead enforcement initiative conducted 17 inventories including 29 wellhead areas and 40 wells were investigated. Over 1997 the Wellhead Protection Technical Assistance and Outreach project focused on (a) integrating public outreach for the Hopkinton/Richmond area, (b) preparation of a wellhead protection plan for W. Greenwich, and (c) a road-sign project in S. Kingstown. Technical assistance was provided to six communities and included a wide range of outreach activities.

d. Nonpoint Source Pollution Request for Competitive Grant Proposals

In 1999, for the first time in several years, the NPS program issued a competitive solicitation for grant proposals using incremental 319(h) funding (i.e., Clean Water Action Plan funding). This process was repeated in FY2000 and will continue for as many subsequent years as the budget will allow.

Table 2-2 displays a list of projects and Figure 2-3 shows their location.

Table 2-2
Water Quality Restoration Actions
FY99-FY00

Water Quality Restoration Actions

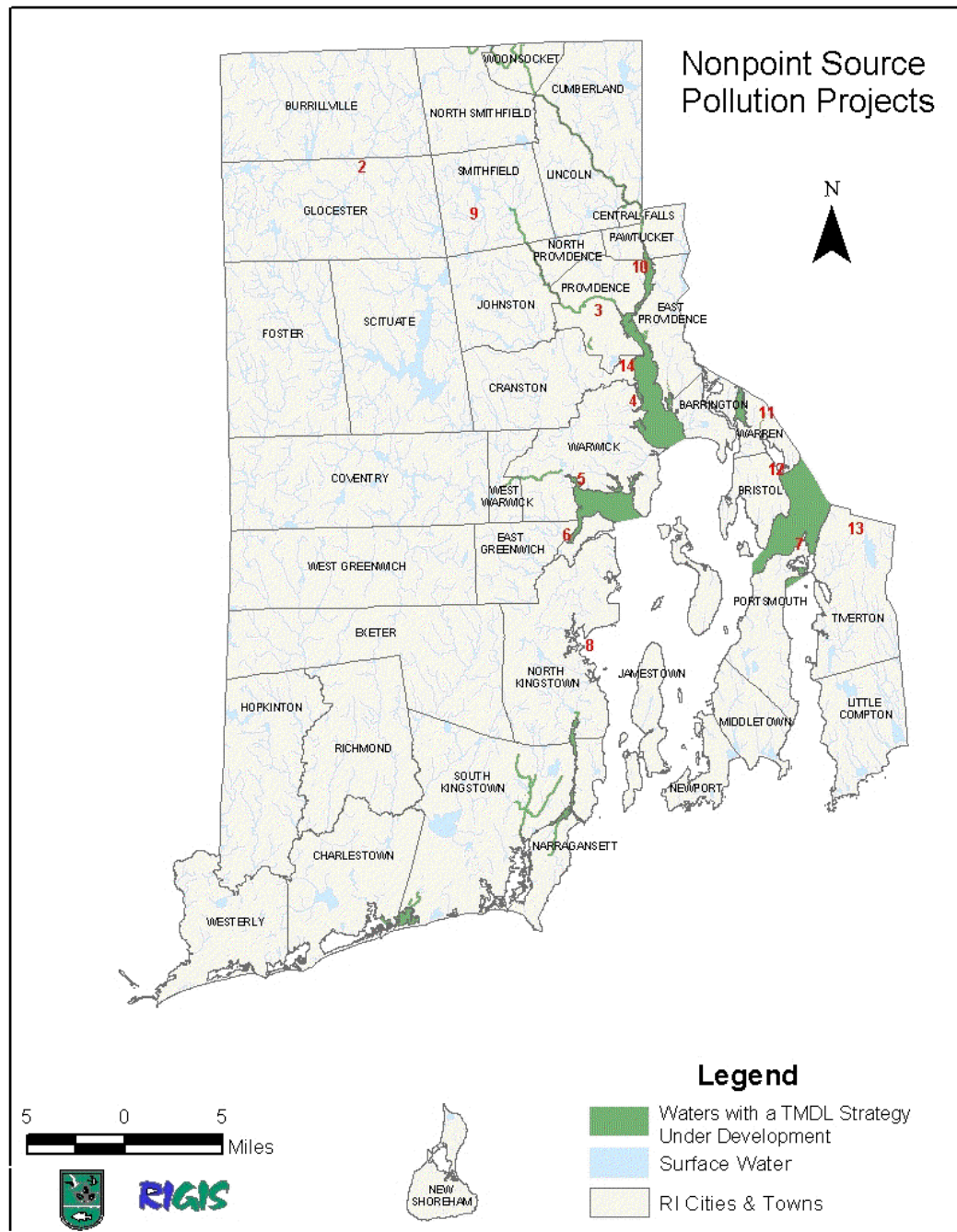
Support restoration of waters impaired by NPS or hydromodification or to improve aquatic habitats degraded by NPS, with highest priority assigned to Group 1 waterbodies of the Rhode Island 303(d) list. (303(d) Group 1 waterbodies are waters not meeting Rhode Island Water Quality Standards where TMDL development is currently underway.)

Sponsor Waterbody & Map Location	Sponsor Waterbody & Map Location	Project Name	Impairment of Concern and Suspected Source	Project Plan	Award
Glocester Chepachet River map location: 2	Glocester Chepachet River	Onsite Construction of Demonstration Wastewater Systems and Stormwater Management Planning	A recent study, commissioned by the Town of Glocester, indicates some pathogens and nutrients from wastewater and stormwater inputs to the Chepachet River and Chepachet River Aquifer	Design and build innovative septic systems as a demonstration project and develop a stormwater abatement plan	\$72,212
Providence Woonasquatucket River map location: 3	Providence Woonasquatucket River	Woonasquatucket/Lincoln, Lace and Braid Sluiceway Removal and Wetland Restoration	Biodiversity, pathogens, PCBs, dioxin and metals--this project will address VOCs, low Do, bacteria and habitat/wetland restoration	Remove the sluice and restore freshwater wetlands values in the area.	\$71,400
NRICD & Cranston Providence River (Still House Cove) map location: 4	NRICD & Cranston Providence River (Still House Cove)	Still House Cove Stormwater BMP Feasibility	Hypoxia and nutrients (Providence River just above the Pawtuxet River)	Design a stormwater abatement BMP.	\$14,614
Warwick Greenwich Bay map location: 5	Warwick Greenwich Bay	Greenwich Bay Watershed Stormwater Treatment Feasibility and Implementation Project	Pathogens, nutrients and hypoxia-- Stormwater outfalls were previously identified in an Aqua Fund project or by URI in a TMDL study.	Design and install stormwater abatement BMPs at eight outfalls.	\$240,000
SRICD Greenwich Bay map location: 6	SRICD Greenwich Bay	Brush Neck Cove Stormwater Abatement and Restoration Interim Measures	Pathogens, nutrients and hypoxia-- Stormwater outfalls were previously identified in an Aqua Fund project and by URI in a TMDL study.	Investigate retrofit potentials for 10 stormwater systems, identify a priority listing of stormwater systems for future work and conduct public outreach.	\$99,244
E. Greenwich Greenwich Cove map location: 6	E. Greenwich Greenwich Cove	Greenwich Cove Stormwater Feasibility	Hypoxia and nutrients--E. Greenwich has identified three stormwater outfalls, which are considered major contributors.	Develop conceptual engineering designs for stormwater BMPs at 8 locations.	\$15,000

Table 2-2. Cont'd

Portsmouth Sakonnet River (Portsmouth Pk.) map location: 7	Portsmouth Sakonnet River (Portsmouth Pk.)	Facilities Plan Update and Feasibility Study for Portsmouth and Island Parks	Pathogens--In a recent DEM study failed septic systems and stormwater were identified as sources of impairment.	Develop engineering designs for stormwater and wastewater abatement throughout Portsmouth and Island Park.	\$60,000
North Kingstown & STB Wickford Harbor map location: 8	North Kingstown & STB Wickford Harbor	Wickford Harbor Stormwater BMP Feasibility and Smart Growth Implementation	Wickford Harbor is conditionally closed to shellfishing, primarily due to its proximity to marinas.	Develop engineering designs and smart growth BMPs for stormwater abatement.	\$59,384
Smithfield Stillwater Reservoir map location: 9	Smithfield Stillwater Reservoir	Smithfield Salt Storage Shed	Leachate from the uncovered municipal salt pile erodes into the watershed and possibly GW	Build a salt storage facility.	\$ 66,000
Providence York Pond/ Seekonk River map location: 10	Providence York Pond/ Seekonk River	York Pond Restoration	Sediment and other pollutant loading to York Pond.	Implement habitat improvements to York Pond.	\$161,762
Warren Warren Reservoir map location: 11	Warren Warren Reservoir	Warren Reservoir Fish Way	Loss of an anadromous fish run (including an Alewife run) due to an impoundment for a drinking water supply.	Design and build a fish way.	\$ 82,000
Warren Kickemuit River map location: 12	Warren Kickemuit River	Patterson Avenue Drainage Project	Stormwater runoff from the Patterson Avenue area containing TSS, metals, TPH, oil and grease.	Installation of a Vortech unit and oil separator.	\$ 72,000
Tiverton Unnamed wetland map location: 13	Tiverton Unnamed wetland	Tiverton Salt Storage Facility	Salt leachate from an uncovered salt pile erodes into a nearby wetland.	Build a salt storage facility.	\$ 63,600
Cranston Providence River map location: 14	Cranston Providence River	Cranston BMP Implementation	Hydrocarbons, metals, sand, floating debris in 4 stormwater outfalls at the ends of Armington, Norwood, Arnold and Shaw Avenues.	Installation of 4 Vortech units and the purchase of a vacuum truck for maintenance of the Vortech units.	\$118,380
Total					\$1,195,596

Figure 2-3.



e. Other Watershed Implementation Activities

- *Greenwich Bay Watershed* – During 1996 and 1997, two key 319 projects have furthered the restoration of Greenwich Bay. The Comprehensive NPS Watershed Project for Warwick and Brushneck Coves provided financial assistance for 169 sewer hookups. In addition, the project has provided outreach through Save The Bay. The Greenwich Bay Technical Assistance and Outreach Project has provided funds to install innovative and alternative septic systems at five sites in the Greenwich Bay Watershed.

- *Runnins River Watershed* – DEM's efforts along the Runnins River have focused on getting implementation projects in the watershed underway. DEM has been working with RIDOT to secure funding sources for two of the five high priority sites identified by the 1995 wet weather study. The corrective actions have yet to be started at the two sites, however. RIDOT has also prepared a preliminary design for a third site. Corrective actions have been completed at the Wannimoisett pump station. The pump station capacity has been increased. East Providence is also investigating inflow and infiltration that contributes to excessive system flows in the East Providence system.

DEM has also been collaborating with Massachusetts state agencies through the Runnins River Steering Committee and the Narragansett Bay Watershed Team, to promote stormwater and habitat improvements along the lower river. In early 2001, DEM and the Massachusetts Executive Office for Environmental Affairs (MAEOEA) conducted a series of meetings to generate ideas for next steps in the "Mink Triangle" area. The forums generated a proposal to develop a stormwater management study of the Mink triangle area that has received 604(b) funding from the State of Massachusetts. It is expected that this study will lead to management actions and conceptual stormwater structure designs, and wetlands restoration projects in the area.

- *Stafford Pond Watershed* - Stafford Pond is a 480 acre waterbody located in Tiverton, RI. The pond serves as a drinking water supply for residents of Tiverton and Portsmouth. The pond was experiencing frequent algal blooms, leading to taste and odor problems and prompting the Stone Bridge Fire District to upgrade its water treatment practices. In 1995, DEM awarded \$107,000 of a state NPS bond fund grant to Fugro East, Inc. to conduct an in-depth limnological investigation of the pond. The goals of the study were to assess the water quality of the pond and its tributaries, identify pollution sources, and develop cost-effective solutions for controlling pollution. The study began in February 1996 and was completed in 1997. Results indicate that the algal blooms are primarily the result of high phosphorus loadings, principally coming from a local dairy farm. The NPS Program has also provided funds for follow-up BMPs. In 2000, the TMDL, which was based upon the results indicated in the 1997 Final Report, was approved by EPA. Implementation of the recommendations outlined in the TMDL have almost been completed. Monitoring of the response of the pond is being implemented by DEM's Office of Water Resources and Division of Agriculture and by the data collected by the Watershed Watch Program.

- *Bailey Brook* – The Newport system supplies water to the Aquidneck Island communities of Newport, Middletown, and Portsmouth. For many island residents, this system provides the only readily available source of drinking water. Urbanization of the

watershed has increased impermeable surface and raised stormwater runoff volumes and velocities. Greater stormwater runoff has led to increased flooding, accelerated erosion, and alteration of stream bed and reservoir bottom composition. Urbanization has also heightened runoff concentrations of heavy metals, pesticides, oil, road salt, organic chemicals, and nutrients. The NPS Program has provided financial and technical support to the City of Newport to construct a stormwater runoff retention pond in the Bailey Brook Watershed.

- *Saugatucket River Watershed* – Upper Point Judith Pond is closed to shellfishing due to high fecal coliform bacteria levels. Recent data from the Salt Pond Watchers, a local citizens group, indicated water quality problems on the Saugatucket River which flows in to upper Point Judith Pond. The NPS program, along with the 604(b) Water Quality Management Planning program, contracted URI to conduct an investigation of the pollution sources to the river. The results of this study are being used to model water quality and perform a TMDL. Sampling for the project began in spring 1996 and was completed in late 1997.
- *Common Fence Point Salt Marsh Restoration* – Approximately 45 years ago, over 20,000 cubic yards of dredge spoil from Mount Hope Bay was deposited in the Common Fence Point tidal marsh/pond complex. The spoil deposition had completely altered the preexisting complex. In 1996 the NPS program provided the Common Fence Point Improvement Association with a Section 319 grant to remove the dredge spoil from more than five acres of tideland. Once the spoil had been removed, the work continued with the installation of a tidal flushing system and digging of a channel to reconnect the marsh with Mount Hope Bay. The restoration team also created a 2.6 acre salt marsh by transplanting seeds and shoots from marsh near the site. The previously existing dike was widened to a uniform width of 40 feet and water runoff was redirected to a sedimentation basin. This project has won two awards for excellence.
- *Galilee Salt Marsh Restoration* – DEM's Division of Fish and Wildlife has owned and managed the Galilee Bird Sanctuary since 1955. Construction of the Galilee Escape Road, which bounds the sanctuary to the north, took place in 1956. The roadway fragmented the wetland and interrupted normal tidal flow. This caused a dramatic change in habitats, decreasing salt marsh and increasing the abundance of common reed and scrub habitat. As a result, suitable habitats for salt marsh wildlife species declined, particularly for important migratory birds, including black ducks and several shoreline birds. Finfish and shellfish habitat and breeding ground was lost and the value of the area as a recreational and cultural resource greatly diminished. As a companion to a Coastal America Program project, the NPS program provided Section 319 funds to purchase and install tide and sluice gates. The tide and sluice gates have helped to restore normal daily tidal flushing and reinvigorate the salt marsh ecosystem.
- *Curran Brook Sedimentation Pond*--Curran Brook runs through an urbanized section of Cumberland to its terminus in Robin Hollow Pond. Robin Hollow Pond is a major part of the Pawtucket Water Supply System, which serves over 100,000 people in the northeastern quarter of Rhode Island. The Curran Brook Sedimentation Pond was developed and built using 319 funds granted by DEM in cooperation with the

Pawtucket Water Supply Board, Northern Rhode Island Conservation District and NRCS. The sedimentation pond is designed to abate sediment, nutrients and fecal coliform.

- *Zambarano Hospital*--Zambarano Hospital is located in the Town of Burrillville and has its own water supply, sewage treatment plant and maintenance personnel. At the time this project began, the Director of Maintenance was seeking to remove one of three parking lots adjacent to Wallum Lake and replace it with a wet pond for treating stormwater from the other lots. Prior to this project, the runoff was going directly into the lake about 50 feet from the drinking water intake.

This project decreased runoff by removing one parking lot and addressed runoff from the remaining two parking lots and impervious areas around the pump house. A dry well that discharged into Wallum Lake was retrofitted with oil/water separators and rerouted into the water quality basin.

The project included design and construction of a wet pond. A management plan was also developed by the Northern Rhode Island Conservation District. Zambarano staff were provided with comprehensive training on maintenance and upkeep.

- *Watchaug Pond*--Watchaug Pond is located in Charlestown, RI and is bordered on the south, west and north by Burlingame State Park. The pond is considered to have highly valuable recreational and habitat resources. At the start of this project, nutrients, sediment and oil degraded water quality in the pond, threatening to turn its condition eutrophic. Nonpoint pollution from state-owned property was documented by a clean lakes study to include sources in the Burlingame Main Camp Beach area, Burlingame picnic area and Burlingame camping area. This project addressed runoff from roads, parking lots and other surfaced parts of the Burlingame camping and picnic areas.

Construction in this project consisted of two parts – the picnic area and the Main Camp Beach area. Prior to this project, the parking lot at the picnic area was oiled dirt and rain events would drain oily runoff from this surface down an access road directly to the pond. Construction included the paving of the parking area and installation of a number of drains, improvements to existing pipes and the installation of two underground catch basins and a rip-rapped drainage area at the base of the hill. Concrete and asphalt berms direct any overland runoff from the parking lot down the hill to a drain and into the catch basin. Since construction, the amount of sediment and oiled material reaching Watchaug Pond from the parking area has greatly diminished.

The Main Camp Beach area is in the oldest part of Burlingame State Park. The area consists of 90 wooded campsites, which slope downhill toward the beach. DEM Park staff stated that drainage in this area was extremely poor and, prior to the project, runoff caused substantial erosion of soil, nutrients and litter into Watchaug Pond. Construction throughout the Main Camp Beach area consisted of the installation of asphalt berms to direct runoff to 5 dry wells and 4 inground pipe and berm systems, which direct runoff to rip-rap lined swales. Park maintenance staff are deployed

following rain events to make sure that the drain grates are cleared of any debris. DEM Park staff stated that the construction has substantially reduced runoff into the pond.

f. Coastal Nonpoint Pollution Control Program (CNPCP)

The CNPCP was developed by the Coastal Resources Management Council (CRMC), the Department of Environmental Management, and the Division of Planning, with assistance from representatives of numerous environmental and trade organizations, local governments, the academic community and other state agencies. After an 18-month development process, the CNPCP was submitted to the National Oceanic and Atmospheric Administration and EPA in July 1995 in accordance with the requirements of section 6217 of the coastal Zone Reauthorization Amendments of 1990. Rhode Island became the first state to receive the formal conditional approval for its CNPCP from NOAA and the EPA in the fall of 1997. Rhode Island became only the second state to receive full approval of its CNPCP in April 2000.

7. Coordination with other Agencies

The Office of Water Resources coordinates activities with various other federal, state and local agencies and organizations. This coordination takes a number of different forms. In addition to EPA, examples of such coordination are as follows:

- a. Coastal Resources Management Council –OWR coordinates with CRMC on various matters including permit coordination, aquaculture, SAM Plan revisions, septic system matters and the pending establishment of a jurisdictional line between the agencies with respect to freshwater wetlands jurisdiction.
- b. Department of Health - DOH provides chemical analytical services and assistance to RIDEM under contract for various surface and wellwater samples as well as compliance and pretreatment monitoring. The OWR Groundwater section coordinates with the DOH Public Water Supply program on issues related to wellhead protection. The Groundwater Section coordinates with the DOH Office of Private Well Contamination on responses to individual homeowners. DOH assists the OWR in issuance of fish advisories and development of human health water quality criteria and risk assessments for consumption of contaminated fish in addition to assessments of drinking water supplies for the Section 305(b) Report. The OWR also coordinates with the DOH on Drinking Water SRF program activities as well as other water supply issues.
- c. Office of Agriculture - Per the Memorandum of Understanding between DEM and NRCS, the Office will continue to coordinate with the Office of Agriculture on reviewing projects which require an Agricultural Wetlands permit. The Office will also continue to assist in the development and implementation of the strategy to prevent groundwater contamination from pesticides and nitrogenous fertilizers. The Office will also continue to assist the Agriculture programs on water quality issues relevant to any of their activities/projects.
- d. Natural Resource Conservation Service (NRCS)- Per the Memorandum of Understanding between DEM and NRCS, the Office will continue to coordinate with NRCS on Agricultural Wetlands issues. In addition, upon request, the Office will assist NRCS in agricultural water quality issues. The Office will continue to use the expertise of NRCS relevant to the watershed planning process and participate in the NRCS State Team meetings.
- e. Water Resources Board - The Water Supply Management and Groundwater (Wellhead) programs interact routinely with the Water Resources Board.
- f. USGS - The Office will continue to use the services of the USGS for monitoring of flow and chemical analyses within rivers in Rhode Island.
- g. URI - Through a variety of mechanisms, seeking professional advice and contracting professional services, the OWR interacts with the University.

Examples of programs the OWR cooperates with include Sea Grant, the Graduate School of Oceanography, Natural Resource Sciences, the Department of Civil and Environmental Engineering, and the Cooperative Extension to name a few.

- h. Army Corps of Engineers (ACOE) – OWR participates in the Providence River Dredging Project Workgroup being coordinated by ACOE. OWR also coordinates with ACOE on programmatic general permit (PGP) process and habitat restoration projects.

C. COST/BENEFIT ASSESSMENT

A true cost/benefit assessment for the OWR is, at best, difficult to obtain. This is due to the complexities involved in evaluating the economic value of incremental improvements in water quality. Efforts have been made to compare the biennial 305(b) water quality assessments in an attempt to determine changes and/or trends in water quality over time. However, this has been unsuccessful due to changes in the evaluation protocols and the lack of a direct correlation between water quality improvements, environmental/natural resource improvements, and the associated economic impacts and valuations of these improvements. Nonetheless, some estimates of the costs and benefits of improvements in water quality and water resources are available.

Rhode Island has received \$284,200,000 in Federal Construction Grants Program funds from the Environmental Protection Agency (EPA) since the inception of the Federal Clean Water Act (P.L. 92-500) in 1972. These federal grant funds along with the \$64,600,000 in state matching grant funds made it possible for all of the wastewater treatment facility and sewer projects noted below to be constructed. The environmental and economic benefits produced by these projects are significant. These projects not only improved the water quality in the shellfish growing areas, but also allowed additional shellfish growing areas to be reopened. These water quality improvements have not only benefited the shellfishing and finfishing industries, which are a combined \$225 million a year industry, but they have also supported the \$3.26 billion a year tourism industry.

Of the total projects constructed with these funds, six projects involved the construction of new treatment facilities and sewer systems that eliminated sewage discharges, resulting in significant water quality improvements. These six facilities are Burrillville, Jamestown, Newport, New Shoreham, Smithfield, and South Kingstown. The Jamestown and South Kingstown projects involved replacement of existing sewerage systems and construction of secondary treatment facilities. The Newport project involved replacement of sewers and separation of combined sewers. These projects have resulted in water quality improvements that have enabled the opening of bathing beach and shellfish growing areas. The other three projects involved new WWTFs and installation of sewers, where there were none previously. The benefits of extending sewer service to previously unsewered areas is difficult to assess as many small untreated (failing ISDS) sources are replaced by one large treated point source. It should be noted that the Burrillville and Smithfield projects involved better than secondary treatment, and that neither of these projects resulted in the significant degradation of water quality in the vicinity of the discharge or impairment of existing uses. The third project (New Shoreham)

required that a shellfishing closure, formerly operated on a seasonal basis, be made permanent in the vicinity of the outfall. The construction of this facility and the absence of local control over land use induced growth in the tourist industry which overloads the treatment works during summer months. Following corrective actions in plant operations, a state moratorium on sewer connections was lifted. The Town has instituted a program to review connections on a case-by-case basis. The Town completed a solids handling/dewatering and an additional clarifier project on 28 September 1990, which dramatically improved the plant's ability to remove solids from its effluent and meet its 30/30 permit limitation.

Seven projects involved upgrading an existing primary facility to a secondary treatment plant, as required by the Clean Water Act. These facilities are the Bristol, East Greenwich, Narragansett-Scarborough Hills, Newport, Warren, Westerly, and Woonsocket facilities. The upgrading of the Westerly facility, coupled with sewerage works construction in Stonington, Connecticut, resulted in the opening of shellfishing areas in Little Narragansett Bay in the late 1980s. (Nonpoint sources of pathogens required this areas to be closed to shellfishing again the 1991). The upgrading of the Woonsocket plant has raised the water quality of the Blackstone River from a Class D to a Class C river, making it consistent with water quality goals. The improvements at the Bristol, East Greenwich, Newport, Warren, and Narragansett plants have improved bathing water quality at nearby beaches, and shellfishing areas were opened in Warren.

Five projects involved sewers only [Barrington, Warwick-Oakland Beach, Middletown, Narragansett (North End), and West Warwick-Natick], specifically, sewerage areas not previously sewerage and discharging to an existing WWTF. In Barrington, the entire town was sewerage, eliminating many problems with subsurface disposal systems in that high water table area.

Five projects involved upgrading existing secondary WWTFs to larger, more modern facilities. The East Providence WWTF was upgraded to accept the increased flow from the new Barrington sewerage system. The Cranston WWTF was upgraded to a 23 MGD secondary plant. The Narragansett Bay Commission Bucklin Point Facility, formerly the Blackstone Valley District Commission (BVDC), received improvements to the clarification, aeration and solids handling and dewatering systems. The City of Warwick's facility received major improvements to its septage receiving, clarification, aeration, solids digestion and dewatering, and chlorination systems, enabling it to provide advanced treatment during the summer months.

The largest wastewater treatment facility (WWTF) project in the State involved the upgrading of the Narragansett Bay Commission (NBC) Field Point WWTF in Providence. Contract I, the major upgrading of the existing primary and secondary WWTF, was completed on June 29 1989. This increased NBC's average daily flow to 77 MGD and its peak design flow to 91 MGD. Contract IIA was completed on December 21 1990 with the complete rehabilitation/improvement of the Ernest Street Pump Station. New headworks and grit removal facilities were provided under Contract IIB, which was completed on January 17 1992. Studies on the alternatives for permanent solids handling and disposal are currently ongoing. The Field's Point Combined Sewer Overflow (CSO) treatment facility was completed on 29 January 1991 under Contract IIC. The completion of these projects has resulted in water quality improvements to the Providence River under dry weather and moderate wet

weather conditions. However, the remaining CSO's in NBC's Sewerage System still cause significant water quality degradation in the Providence River and Upper Narragansett Bay following excessive rainfall.

These expenditures have resulted in significant gains in water pollution control as well as improved water quality conditions. Between 1984 and 1994, statewide pollutant loadings from WWTFs have been reduced 76% for BODs and 60% for total suspended solids. A recent report covering 1998 and 1999 reported that 12 WWTFs had no violations of conventional pollutant permit limits, while 4 plants had two or fewer violations, and only 3 plants had more than three violations.

All major municipal wastewater treatment facilities have achieved at least secondary treatment. Currently, the three largest categories of construction needs for further water quality improvements are combined sewer overflows (from the Narragansett Bay Commission's Sewerage Systems); advanced treatment, (particularly for the Pawtuxet River communities of Cranston, Warwick, and West Warwick); and nonpoint source implementation projects.

D. SPECIAL STATE CONCERNS AND RECOMMENDATIONS

1. State Concerns

a. Sustainable Watershed Initiative

Rhode Island recognizes the advantage of working on a watershed basis when protecting and managing natural resources. During the past several years, DEM has worked with a number of partners to develop a framework by which the watershed-based approach to resource management can be expanded. DEM is currently working with stakeholders to pilot the watershed approach in two areas: Southern Rhode Island and the Woonasquatucket River watershed. The goal is to engage stakeholders to collaborate and devise action plans that more effectively address watershed concerns. The initiative is being used to promote improved environmental planning and other “smart growth” strategies. The watershed initiative is reflected in many of the following descriptions of state concerns.

b. Monitoring Needs

Through the 305(b) assessment process, DEM identified gaps in available water quality data as a significant concern. While steps have been taken to expand monitoring, as this report indicates, the data gaps remain significant: 21% of lake acres and 64% of river miles are unassessed. Additionally, data currently used to support the assessment of surface waters may become outdated in the near future creating additional gaps on selected parameters such as toxics/metals. OWR is committed to developing a monitoring strategy that will provide a framework for eliminating significant geographic gaps in data and insuring adequate coverage of parameters of concern. The framework will reflect the partnerships and collaborations that occur among state, local and federal agencies, universities and colleges, other organizations and volunteers regarding monitoring activities. Additional resources will be required to implement a

comprehensive monitoring program that meets the needs of water resource managers.

c. Combined Sewer Overflows (CSOs) – Upper Narragansett Bay

The major impairment of use in Narragansett Bay results from bacterial contamination. Clearly, the most significant sources are the combined sewer overflows that discharge in the Providence metropolitan region into the upper bay or its tributaries. Significant portions of the estuary area temporarily closed to shellfishing following rainfall events of one-half inch or more. A previous inventory identified eighty-six CSO outfalls which discharge to the Providence River or its tributaries. These CSOs fall under the auspices of the Narragansett Bay Commission (NBC). The NBC's Wet Weather Facility located at the Fields Point WWTF provides primary treatment for up to 123 MGD of wet weather flow.

NBC has finished a system-wide CSO facilities plan. The recommended initial plan featured three tunnel branches and seven near surface storage facilities at total estimated project cost of \$476 million. NBC established a CSO Stakeholder Group to involve interested parties in evaluating the current CSO program and alternative plans. After months of meetings, the stakeholder process developed a consensus around an alternative plan divided into phases. The group supported implementation of Phase I, which included a main tunnel, two stub tunnels and an upgrade to the Bucklin Point facility. Prior to initiating Phase II and III, the group determined additional evaluations, including water quality monitoring studies, were desirable. The Stakeholder Group will continue to monitor progress on the CSO abatement strategy

Construction has commenced on building Phase I of the CSO facility. NBC has also eliminated sixteen CSOs by plugging the discharge pipes. As a result, the number of active CSOs in the NBC system is 70.

d. Watershed Restoration – Developing TMDLs

Restoring the quality of rivers, lakes and coastal waters to support their designated uses has emerged as a state priority. Accomplishing actual restoration remains a significant challenge. The 2000 303(d) list for Rhode Island includes over 120 waterbody listings for a range of impairments. The most common impairments involve nutrients, metals and pathogens. Working within available resources, DEM and its contractors are conducting assessments of impaired waters pursuant to an aggressive schedule. The assessments and corresponding restoration plans, known as Total Daily Maximum Load (TMDLs), provide the technical basis for investing in pollution abatement. The development of TMDLs is done with stakeholder input at all stages. Given the nature of RI's water pollution problems and the significant contributions of nonpoint sources, the restoration plans in most watersheds will be multi-faceted. To support local implementation, DEM is giving priority to TMDL-related projects in the distribution of nonpoint abatement grants. However, it is clear that additional resources are needed in order to meet the demands of the TMDL mandate. The needs include

funding for assessment, local capacity building, local implementation projects and program coordination.

e. Nonpoint Source Pollution – Septic Systems

Nonpoint pollution sources are suspected of being the major contributors in a majority of the impaired water bodies included on Rhode Island's 303(d) list. Septic systems – either failed or substandard – are recognized as one of the leading NPS problems in the state – contributing nutrients, bacteria and potentially viruses to both coastal and inland waters. Of the estimated 140,000 septic systems in the state, over 70,000 are suspected of being inadequate. Consistent with the Nonpoint Source Pollution Management Plan, a multi-faceted strategy has been pursued to prevent and abate pollution from septic systems. Key components of the strategy include: (1) licensing of ISDS designers and related regulatory reforms, (2) institution of soil-based siting approach, (3) demonstration of innovative and alternative (I & A) technologies and related training, (4) creation of a process to evaluate and approve specific I & A technologies, (5) establishment of local wastewater management programs, (6) providing financial assistance for upgrades of septic systems via the Clean Water Finance Agency (CWFA) and (7) expansion of public education and outreach; e.g. promote proper system maintenance. Fourteen of the 27 communities which rely significantly on septic systems are now developing or implementing local wastewater management programs. Additional grants to support local programs are planned. Continued implementation of program initiatives to encourage the upgrade and replacement of inadequate septic systems will remain a priority.

f. Nonpoint Source Pollution – Stormwater

Untreated stormwater discharges constitute a second major NPS pollution concern in RI. Runoff from a wide range of land uses, e.g. industrial, suburban, agricultural can contribute to water quality degradation. Given the density and pattern of development in the state, strategies to address stormwater management must involve both prevention and abatement; e.g. retrofit programs. With the implementation of Phase II stormwater requirements, DEM expects an increased demand for both technical and financial assistance from local entities. Needs include, among others, improved guidance on BMPs, training, a better understanding of BMP performance and support to build and implement local stormwater programs. Additionally, from the prevention perspective, there is a need to develop the local planning capacity to allow application of innovative land use controls which may have the benefit of reducing runoff. To be most effective, stormwater management strategies should be considered in the context of watersheds. DEM expects the development of TMDLs to continue to provide an important means to identify and prioritize stormwater abatement projects that are needed to accomplish watershed restoration goals.

g. Sediments – Toxics and Dredging

Toxics have been a significant concern historically in Rhode Island waters, particularly in the Upper Bay and urban rivers. However, with the effective implementation of industrial pretreatment at WWTFs, total metal loadings to surface waters from WWTFs have fallen dramatically. For example, the NBC documented a

93% decline in effluent metal loadings between 1981 and 1995. While surface waters have benefited from such improvements, the historical, long-term industrial use of Rhode Island's urban rivers have left a challenge with respect to toxic contamination of sediments. Recent sampling of sediments in the Woonasquatucket River watershed confirmed the presence of dioxin at elevated levels. Subsequently, the EPA expanded its assessment and eventually designated selected areas along the river on the National Priorities List (NPL). Unfortunately, the extent of sediment contamination in all RI urban rivers is not yet fully characterized and it remains a concern warranting future attention.

The presence of toxics in sediments makes the process of locating dredge disposal sites even more challenging. Rhode Island, in collaboration with the ACOE, is planning on undertaking a major dredging project to restore the Providence River shipping channel. Designated dredge disposal areas have been identified for this project. CRMC has been tasked by the legislature to prepare a statewide dredging plan, which would address the routine dredge disposal needs of marinas, etc. Preliminary disposal sites have been identified but additional site characterization is needed. OWR will be involved in all dredging projects to insure that water quality impacts will be minimized.

h. Narragansett Bay – Nutrients and Dissolved Oxygen

Recent monitoring projects have begun to identify impacts of nutrient loadings to the Bay. Studies in the Providence River suggest that long-standing dissolved oxygen problems are linked to the level of nitrogen inputs to the upper estuary. The upper Bay areas are important spawning grounds for a variety of fish and shellfish and these populations may be seriously impacted by even short-term anoxic or hypoxic events. During the summers of 1999-2001, DEM, in collaboration with partners, conducted dissolved oxygen surveys, which indicated concerns in the upper bay, Greenwich Bay and upper West Passage. DEM is placing greater emphasis on promoting nutrient reduction through workshops, training sessions and development of other strategies that can be undertaken in the interim to WWTF upgrades. Additional data is needed to support a management strategy that will be protective of water quality parameters and reflect an understanding of the impacts on the health and productivity of Bay organisms as well the economic impacts on commercial and recreational fisheries.

i. Habitat Restoration – Coastal and Inland

Habitat restoration has become increasingly important on the national and local level, especially as studies across the country reveal how much of these resources we have lost or degraded. Here in R.I., we have lost 37% of all coastal wetlands that existed in colonial times (from 102,000 acres to 65,000 acres). Areas of the Bay that were once covered with eelgrass beds, such as Greenwich Bay, now have none. Recent studies conducted by the NBEP with other partners estimate that there are only about 50 acres of eelgrass left in a bay that once had extensive beds. The loss of freshwater wetland habitat is not as well quantified. Both freshwater wetlands and coastal marshes have been impacted from nonpoint source pollution and sedimentation as well as lost to land development. But agencies, organizations, politicians, and citizens

are responding to this problem at all levels. Efforts are underway to pass national legislation that will provide federal dollars for estuarine habitat restoration. State agencies are collaborating with a wide range of partners to develop habitat restoration strategies for coastal habitats as well as freshwater wetlands. Mapping and prioritization projects are in various stages of completion for coastal and inland habitats. Nearly 100 specific restoration opportunities have been mapped and in recent years an increased number of projects have been completed. More funding is needed to facilitate habitat restoration and evaluate over time the ecological success of the projects.

j. Low Flow Impacts - Hydromodification/Withdrawals

Low flow characteristics of streams are important elements in the planning and developing of water resources, especially with respect to water supply and wastewater discharge. Planners and managers in Rhode Island are concerned that excessive withdrawals of water from certain streams or adjacent aquifers could severely impact the quantity and quality of stream water available during low flow periods. Two critical flow levels are the aquatic base flow and the 7Q10 flow. The aquatic base flow is a flow at which there is adequate water in the stream to sustain a healthy aquatic habitat. The 7Q10 flow is the flow that is used to evaluate pollutant concentrations in relation to developing wastewater discharge permit limits. Information on flow levels of streams is readily available at locations where streamflow data have been systematically collected for a number of years by the U.S.G.S. However, there are only approximately 16 gaging stations currently operating in Rhode Island. Additional information will need to be collected to fully characterize low flow concerns.

Rhode Island does not have a water withdrawal permitting system to regulate water withdrawals. Conditions may be placed on new projects involving withdrawals as a result of applying state wetlands or water quality regulations. Impacts to the aquatic habitat occur due to loss of riverbed area covered by water, inadequate instream water depth for a healthy, reproducing natural fish population and increased pollutant concentrations downstream of dischargers, where discharge limits based on previous 7Q10 flows, may no longer be valid.

The concern about low flows has been identified as a priority in the Pawcatuck River basin due to a heavy demand for irrigation withdrawals for both agriculture and golf courses. A subcommittee of the Wood-Pawcatuck Watershed Initiative formed to develop a voluntary approach to address water withdrawal concerns. As a result, a multi-year study was undertaken to assess the impacts on aquatic habitat due to water withdrawals in the Usquepaug watershed. This study, which was recently completed, should provide a stronger technical basis from which the voluntary management plan can be developed.

k. Constraints on Funding Municipal Pollution Abatement Needs

The special concerns identified above coupled with the expanding eligibility's of the State Revolving Fund (SRF) program will place a greater need for an increase in the amount of SRF monies allotted to the State. The Annual Project Priority Lists regularly

show water pollution abatement needs totaling over \$600 million. In addition, the 2000 Needs Survey reported a documented total of \$1.38 billion in wastewater needs for Rhode Island over the next 20 years. As we implement Phase II of the Storm Water Program, the needs for stormwater and nonpoint source will significantly increase over the \$32 million presently indicated on the Needs Survey. Presently, SRF capitalization grants to Rhode Island are averaging only around \$10 million per year.

In addition to the SRF, grants have served as important financial incentives for both water quality and habitat restoration projects. The state also needs to provide assistance to address municipal needs with respect to the implementation of programs at the local level. Key areas of need include stormwater management, on-site wastewater management, land use planning and habitat restoration. The state needs to continue to support a range of financial incentives in order to be successful.

2. Recommendations

The following list of recommendations outlines general action that are deemed necessary to achieve the objectives of the CWA in Rhode Island waters.

- a. The State Revolving Fund (SRF) has successfully become the major source of funding for municipal wastewater treatment and sewerage projects in Rhode Island. The State's 2000 Needs Survey identified \$1.38 billion in wastewater construction over the next twenty years. This significantly exceeds the funds available through the SRF including leveraging. In order to meet these projected needs, greater funding of the SRF is necessary.
- b. The cost of Combined Sewer Overflow mitigation represents a major portion of the future wastewater needs. Special funding, dedicated to CSOs, is needed to supplement annual SRF appropriations to facilitate the implementation of CSO abatement. These special funds should be administered through the SRF program to take advantage of the leveraging abilities of the SRF program.
- c. Municipalities should continue to receive direction and assistance in achieving adequate levels of Operations and Maintenance to maintain the POTWs constructed under the Clean Water Act (CWA).
- d. Growth management strategies are needed to avoid exceeding sewerage system capacities in communities subject to development pressures.
- e. Expansion of water quality monitoring to provide data for assessment of water quality of surface waters (both fresh and salt waters), including nutrients, metals, dissolved oxygen, etc. needs to be continued. Inadequate funding available for baseline monitoring continues to be an obstacle.
- f. Waters which fail to support designated uses should be further evaluated and restored through the development of TMDLs. Financial assistance for pollution abatement, including BMPs to abate nonpoint sources, should be renewed and targeted to support watershed restoration.

g. DEM and its partners should continue to pursue implementation of watershed-based approaches to resource protection and restoration. The coordinating council should continue to identify and address issues related to implementing the Sustainable Watershed Initiative including building support to fund and expand this activity.

h. DEM should continue to review and approve innovative and alternative technologies for on-site wastewater disposal and develop a more systematic means to track their performance.

- i. A Statewide policy to provide for safe and sanitary disposal of septage must be adopted.
- j. All communities which rely significantly on septic systems should develop a local wastewater management program which provides technical or financial assistance and oversight as appropriate to address system maintenance, repair, and replacement needs in the community.
- k. A statewide comprehensive stormwater management strategy needs to be developed to insure the adequate control and treatment of runoff from both new and existing land uses. The strategy should address coordination of stormwater-related permitting and address the financial and technical assistance needs of local entities.
- l. State support of growth management and nonpoint source pollution control efforts is necessary to prevent further water quality degradation to surface and ground water resources from stormwater runoff, septic systems, and other diffuse sources of pollution associated with development. Resources are needed to provide incentives for communities to build capacity to implement local programs that take advantage of innovative land use controls among other strategies.
- m. Statewide policy/guidance is needed in the areas of water conservation and water use (water withdrawals and out-of-basin transfers in relation to water/habitat quality).
- n. The EPA should continue to foster "pollution prevention" and "source reduction" programs. The EPA should work with industrial trade groups to publicize "success stories" and develop implementation strategies.
- o. EPA, DEM and others should work together to promote compliance with the no discharge designation granted for Rhode Island coastal waters.
- p. Implementation of the state groundwater protection strategy should be continued with an emphasis on providing assistance to foster local protection programs and continued policy development to assure consistency and effectiveness among state regulations.
- q. State and local governments must work cooperatively via the Wellhead Protection Program and Source Water Assessment Program to effectively prevent the degradation of groundwater resources that support drinking water supply uses. State capabilities to provide technical and financial assistance should be expanded to meet the needs of local governments and water suppliers.
- r. Additional assessment is needed to determine the extent of nitrate contamination in groundwater throughout Rhode Island. Where elevated nitrogen concentrations have been detected in areas of active agriculture, additional research is needed to identify or refine the best management practices needed to reduce pollutant loading.
- s. Discharges that pose a high risk for adversely affecting groundwater quality

should continue to be eliminated under the closure procedures administered by the Underground Injection Control (UIC) Program. Best management practices should be encouraged at facilities to minimize pollution risks.

t. DEM should continue to pursue improvement to data management systems to allow more effective use of data and information and improve public access to such information. Linking databases via a common geographic identifier should continue to be pursued.

u. Rhode Island should develop a statewide strategy to protect and restore wetland resources. The framework would reflect both regulatory and non-regulatory activities with recommendations on improving protection or restoration.

v. DEM should continue to work with partners to secure a reliable source of funding to support habitat restoration projects. State and local funds should be used to leverage federal funds that are or may become available for such purposes.